

The Office Action rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §112, first and second paragraphs. These rejections are moot in view of the amendments to claims 1, 8 and 14. Accordingly, withdrawal of the rejections of claims 1, 3-14 and 16-24 under 35 U.S.C. §112 is requested.

The Office Action rejects claims 1, 3-7, 14 and 17-20 under 35 U.S.C. §102(a) over Nakata (U.S. Patent No. 4,639,632) and JP-U 3-107821 (JP821). This rejection is respectfully traversed.

Applicant submits that neither of the applied references to Nakata and JP821 discloses or suggests a plurality of leads being provided with a flat leading end portion having a substantially U-shaped edge which opens toward a leading end of the leads, connected substantially in parallel with an electrode, the electrode opposing one surface of the piezoelectric resonator element, and a connecting layer being formed with a conductive resin between the leading end portion and the electrode, and the piezoelectric resonator element being attached to leads at an end of the leading end portion on a portion of the substantially U-shaped edge closest to the piezoelectric resonator element, on a side of the piezoelectric resonator element which faces the supporting member, so that an edge of the piezoelectric resonator element on the side which faces the supporting member may be positioned on the portion of the substantially U-shaped edge and that the piezoelectric resonator element is supported by the leads so that a gap is formed between the supporting member and the piezoelectric resonator element, as recited in claim 1.

In fact, Nakata does not disclose or suggest any lead provided with flat leading end portion which has a substantially U-shaped edge which opens toward a lead end. Instead, Nakata discloses, in Fig. 8 for example, lead-in conductors 7 having an arcuate projection 201 bonded on a side to a quartz plate 8 by an insulating adhesive or sealing material or the like.

Further, JP821 also does not disclose or suggest the features recited in claim 1. JP821, in Fig. 4, for example, discloses leads 2 and 3 with a fork-shaped opening 15 attached to the resonator element 4 by a bonding element. Thus, in JP821, the shock resistance becomes different from each piezoelectric resonator element.

Contrary to the applied references, in the piezoelectric resonator as claimed in claim 1, on a substantially U-shaped edge of the leading end portion on a portion which faces a supporting member, a piezoelectric resonator element is attached so that the supporting member side edges of the piezoelectric resonator element are substantially matched. Thus, the gap between the supporting member and the piezoelectric resonator element is constant, and a spring structure, for example, is made uniform. As a result, a piezoelectric resonator element which can absorb a strong shock during a fall or the like can be implemented without having any irregularities in its shock resistance, for example.

The applied references do not disclose or suggest these features. In JP821, soldering is used for connection between the resonator and the lead, and thus a spring structure cannot be implemented.

For similar reasons, the applied references do not disclose a piezoelectric resonator element being attached to leads at a portion of a substantially U-shaped edge of the leading end portion on a side which faces a supporting member, so that an edge of the piezoelectric resonator element on the side which faces the supporting member may be positioned at the end of the substantially U-shaped opening, as recited in claim 14.

Accordingly, claims 1 and 14 are not anticipated by Nakata and JP821. Further, claims 4-7, depending from claim 1, and claims 17-20 depending from claim 14 also are not anticipated by Nakata and JP821. Applicant requests withdrawal of the rejection of claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §102(a).

The Office Action rejects claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §103(a) over JP-A 6-303077 (JP077), in view of Scott (U.S. Patent No. 3, 849,681), DT 2612643 (DT643) and Ogiso (U.S. Patent No. 5,867,074). This rejection is respectfully traversed.

Applicant submits that the applied reference to JP077 does not disclose or suggest a plurality of leads being provided with a flat leading end portion having a substantially U-shaped edge which opens toward a leading end of the leads, connected substantially in parallel with an electrode, the electrode opposing one surface of the piezoelectric resonator element, and a connecting layer being formed with a conductive resin between the leading end portion and the electrode, and the piezoelectric resonator element being attached to leads at an end of the leading end portion on a portion of the substantially U-shaped edge closest to the piezoelectric resonator element, on a side of the piezoelectric resonator element which faces the supporting member, so that an edge of the piezoelectric resonator element on the side which faces the supporting member may be positioned on the portion of the substantially U-shaped edge and that the piezoelectric resonator element is supported by the leads so that a gap is formed between the supporting member and the piezoelectric resonator element, as recited in claim 1.

JP077, in Fig. 1a, for example, discloses a lead 6 with a fork-shaped opening attached to the resonator element 1 by a bonding element 3. However, JP077 does not disclose that a piezoelectric resonator element is attached to the leads on a portion of the substantially U-shaped edge of the leading end portion on a side which faces the supporting member, so that an edge of the piezoelectric resonator element on the side facing the supporting member may be positioned on the portion of the substantially U-shaped edge, as recited in claim 1. In fact, as shown in Fig. 1 of JP077, for example, there is no gap between the supporting member and the piezoelectric resonator element, so that a rigid structure is provided instead of a spring structure of the claimed invention.

Scott and DT643 also do not disclose or suggest these features of claim 1. In fact, neither of Scott nor DT643 discloses any flat leading end portion, nor U-shaped edges. As shown in Fig. 2, for example, Scott discloses terminals 12 and 13 having tubular ends. Similarly, as shown in Figs. 2a and 2b, DT643 discloses pins 2 and 3 having leading portions without any U-shaped edges.

Furthermore, Ogiso discloses, in Fig. 16, for example, a lead 25 with a V-shaped connected end 25c deformed into a flat shape and attached to a connection land 7 by a conductive adhesive agent 26. However, Ogiso does not disclose that a piezoelectric resonator element is attached to leads at a portion of a substantially U-shaped edge of the leading end portion on a side of the piezoelectric resonator element which faces the supporting member, so that an edge of the piezoelectric resonator element on the side which faces the supporting member may be positioned at the portion of the substantially U-shaped edge, as recited in claim 1. Thus, with the teachings of Ogiso, the shock resistance becomes different from each piezoelectric resonator element, for example.

Even if combined, JP077, Scott, DT643 and Ogiso do not disclose or suggest the features of claim 1. For similar reasons, the applied references do not disclose a piezoelectric resonator element being attached to leads at a portion of a substantially U-shaped edge of the leading end portion on a side which faces a supporting member, so that an edge of the piezoelectric resonator element on the side which faces the supporting member may be positioned at the end of the substantially U-shaped opening, as recited in claim 14.

Accordingly, claims 1 and 14 would not have been obvious over JP077, Scott, DT643 and Ogiso. Further, claims 3-7, depending from claim 1, and claims 16-20 depending from claim 14 also would not have been obvious over JP077, Scott, DT643 and Ogiso. Applicant requests withdrawal of the rejection of claims 1, 3-7, 14 and 16-20 under 35 U.S.C. §103(a).

For at least the above reason, Applicant submits that the application is in condition for allowance. Prompt consideration and due allowance are earnestly solicited.

Should the Examiner believe any further is desirable in order to place the application in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted.



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Attachment:
Appendix

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| DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461 |
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APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claims:

1. (Four Times Amended) A piezoelectric resonator, comprising:
 - a piezoelectric resonator element having a piezoelectric body and an electrode formed on a surface of the piezoelectric body;
 - a supporting member supporting said piezoelectric resonator element; and
 - a plurality of leads mechanically connecting said piezoelectric resonator element to said supporting member and permitting electrical connection thereof, each of said leads being provided with a flat leading end portion ~~which opens in~~ having a substantially U-shaped ~~opening edge which opens~~ toward a leading end of the leads, connected substantially in parallel with said electrode, said electrode opposing one surface of said piezoelectric resonator element, and a connecting layer being formed with a conductive resin between the leading end portion and said electrode, and
 - said piezoelectric resonator element being attached to said leads at an end of the leading end portion on a portion of the substantially U-shaped ~~opening edge~~ closest to said piezoelectric resonator element, of said leading end portion on a side of said piezoelectric resonator element which faces said supporting member, so that an edge of said piezoelectric resonator element on the side which faces said supporting member may be positioned ~~at on~~ on ~~said end portion~~ of the substantially U-shaped opening edge and that the piezoelectric resonator element is supported by said leads so that a gap is formed between said supporting member and said piezoelectric resonator element.
8. (Four Times Amended) A method for manufacturing a piezoelectric resonator, comprising:

attaching a piezoelectric resonator element comprising a piezoelectric body having an electrode formed thereon, to a plurality of leads which connect said piezoelectric resonator element mechanically to a supporting member and permit electrical connection thereof;

providing a gap between said supporting member and said piezoelectric resonator element; and

forming a connecting layer of a conductive resin between said electrode and flat leading end portions of said leads, connected substantially in parallel with said electrode, ~~opening in~~ having a substantially a U-shape U-shaped edge which opens toward a leading end of the leads ~~thereof~~, said electrode opposing one surface of said piezoelectric resonator element,

said piezoelectric resonator element being attached to said leads at an end of the leading end portion on a portion of the substantially U-shaped edge closest to said piezoelectric resonator element, ~~opening of said leading end portion~~ on a side of said piezoelectric resonator element which faces said supporting member, so that an edge of said piezoelectric resonator element on the side which faces said supporting member may be positioned ~~at on said end portion~~ of the substantially U-shaped opening edge.

14. (Four Times Amended) A piezoelectric resonator unit having a piezoelectric resonator, and a hollow protector, the piezoelectric resonator comprising:

a piezoelectric resonator element having a piezoelectric body and an electrode formed on a surface of the piezoelectric body;

a supporting member supporting said piezoelectric resonator element; and

a plurality of leads mechanically connecting said piezoelectric resonator element to said supporting member and permitting electrical connection thereof each of said leads being provided with a flat leading end portion ~~which opens in~~ having a substantially

U-shaped ~~opening~~ edge which opens toward a leading end of the leads, connected substantially in parallel with said electrode, said electrode opposing one surface of said piezoelectric resonator element, and a connecting layer being formed with a conductive resin between the leading end portion and said electrode, and

said piezoelectric resonator element being supported by said leads so that a gap is formed between said supporting member and said piezoelectric resonator element,

said piezoelectric resonator being inserted, and sealed by said supporting member and said protector, and said piezoelectric resonator being attached to said leads at an end of the leading end portion on a portion of the substantially U-shaped ~~opening of said leading end portion~~ edge closest to said piezoelectric resonator element, on a side of the piezoelectric resonator element which faces said supporting member, so that an edge of said piezoelectric resonator element on the side which faces said supporting member may be positioned ~~at on said end portion~~ of the substantially U-shaped ~~opening~~ edge.

21. (Three Times Amended) A method for manufacturing a piezoelectric resonator unit comprising:

attaching a piezoelectric resonator element comprising a piezoelectric body having an electrode formed thereon, to a plurality of leads which connect said piezoelectric resonator element mechanically to a supporting member and permit electrical connection thereof;

providing a gap between said supporting member and said piezoelectric resonator element;

forming a connecting layer of a conductive resin between said electrode and flat leading end portions of said leads, connected substantially in parallel with said electrode, ~~opening in~~ having a substantially a U-shape U-shaped edge which opens toward a leading end

~~thereof~~ of the leads, said electrode opposing one surface of said piezoelectric resonator element:

inserting the piezoelectric resonator element connected to said supporting member into a hollow protector; and

sealing the piezoelectric resonator by said supporting member and said protector,

said piezoelectric resonator element being attached to said leads to an end of the leading end portion on a portion of the substantially U-shaped ~~opening of said leading end portion~~ edge closest to said piezoelectric resonator element, on a side facing said supporting member, so that an edge of said piezoelectric resonator element on the side facing said supporting member may be positioned ~~at-on said end~~ on said end portion of the substantially U-shaped ~~opening edge~~.